BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF DELAWARE

IN THE MATTER OF THE APPLICATION OF ARTESIAN WASTEWATER MANAGEMENT, INC. FOR AUTHORITY TO INCREASE EXISTING RATES AND CHARGES FOR WASTEWATER SERVICE	PSC Docket No. 13-_____

DIRECT TESTIMONY
OF
BRIAN C. CARBAUGH, P.E.
ON BEHALF OF

ARTESIAN WASTEWATER MANAGEMENT, INC.

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS.

A. My name is Brian C. Carbaugh, P.E. I am Director of Engineering Design for Artesian Water Company, Inc. ("Artesian") and my business address is: 664 Churchmans Road, Newark, Delaware 19702.

Q. PLEASE DESCRIBE YOUR BUSINESS EXPERIENCE AND EDUCATIONAL BACKGROUND.

A. I joined Artesian in 2006 with 22 years of experience in the water and wastewater field. I am a Licensed Professional Engineer in both Delaware and Maryland and hold a State of Delaware Class C On-Site Wastewater System Designer license and Class 3 Wastewater Treatment Operator license. Before joining Artesian, I spent 11 years as the sole proprietor of WWES Associates in Dover, Delaware, an engineering firm specializing in investigations, planning, design, permitting, operations, and management of projects in the areas of wastewater management, water supply, and environmental systems. My other work experience has been with CABE Associates consulting engineers in Dover, Delaware and the United States Army Corps of Engineers, Baltimore District. I am a graduate of the University of Delaware, with a Bachelor of Civil Engineering - June, 1982.

I have been active in Delaware engineering and wastewater associations and have served as the Executive Director of ACEC-DE (American Council of Engineering Companies of Delaware), President of the CWEA (Chesapeake Water Environment Association), Treasurer of DOWRA (Delaware On-Site Wastewater Recycling Association), Delaware Board of Certification Liaison for WWOA (Water and Waste Operators Association of

Maryland, Delaware, and District of Columbia), and as an Appointed Member Delaware Board of Certification for Wastewater Facility Operators.

I am also an adjunct professor with Delaware Technical and Community College where I have been the instructor for credit and non-credit courses and seminars in the areas of water quality, water treatment systems, wastewater operations, and hydraulics.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony provides: (1) a discussion of the engineering considerations involved in the design of wastewater systems; (2) a description of Artesian's wastewater systems and the Company's efforts to develop wastewater facilities to meet the current and future demands of its customers; (3) projects to be completed by the end of test period; and (4) explanation of fixed versus variable expenses.

My testimony is accompanied by a number of exhibits. The analyses presented in my testimony and the accompanying exhibits were conducted either by me or under my direct supervision.

III. UTILITY WASTEWATER MANAGEMENT SYSTEMS OVERVIEW

Q. CAN YOU PROVIDE A SUMMARY OF UTILITY WASTEWATER MANAGEMENT SYSTEMS?

A. I have prepared as Exhibit I a document summarizing the Engineering Design and Implementation of Utility Wastewater Management Systems.

Q. WHAT SERVES AS THE BASIS FOR THE DESIGN OF WASTEWATER MANAGEMENT SYSTEMS?

A. The design of wastewater facilities is governed by a balance of engineering principles, regulatory requirements, and design innovation.

Q. WHAT ARE THE PRIMARY COMPONENTS OF A WASTEWATER SYSTEM?

A. A wastewater system is comprised of four (4) primary components: Collection, Transmission (including pump stations and force mains), Treatment, and Disposal.

Q. PLEASE DESCRIBE THE TYPICAL ARTESIAN SEWAGE COLLECTION SYSTEM.

A. The utility collection systems begin at the property line of each residence or other facility served. The collection systems are typically gravity systems that carry the sewage liquid and solid wastes. The collection systems are designed to keep both the solid and liquid wastes flowing to reduce the potential of backups caused by the deposition of solids. Sewer lines must be sized so that the peak sewage flow can be carried without restriction. The design parameters for gravity collection systems include: clean-outs at each connection, minimum size and slopes for service laterals and sewage collection mains, and manhole access as required for maintenance.

Q. WHAT IS THE TRANSMISSION COMPONENT OF THE WASTEWATER SYSTEM?

A. Because gravity collection systems have minimum slopes, sewer lines eventually become too deep below grade to be reasonably maintained. Once the lines are too deep, the collection system is complete and the sewage must be transported to another location or elevation for further collection or treatment. Pump stations and transmission lines (force mains) are utilized to move the sewage.

Raw sewage pump stations are used to lift and transmit sewage from one location and/or elevation to another. In order to avoid excessive depths of sewer lines and/or pumping stations, pumping stations are typically required once the depth of the sewer line is 25 feet. Pumping stations utilize pumps specifically designed for pumping sewage liquids and solids. Pump stations must be designed to handle the peak sewage discharge flow rate and utilize a minimum of two (2) pumps so that flow can be maintained with a pump out of service. Pump stations also include emergency generators or pumps in the event of power failures.

Force mains transmit wastewater from pump stations. The design criteria for force mains ensure that the design flow can be managed and that the solids do not deposit in the lines.

Q. PLEASE DESCRIBE THE TREATMENT COMPONENT OF THE WASTEWATER SYSTEM.

A. Wastewater treatment systems must provide a suitable means of converting raw wastewater into a suitable discharge effluent and manageable residuals. Effluent discharge treatment requirements are regulated by the Delaware Department of Natural Resources and Environmental Control (DNREC) and typically include Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), Nitrogen, and Phosphorus.

Wastewater treatment systems utilize a combination of physical and biological processes, with biological processes performing the majority of the treatment. Biological processes utilize bacteria and other microorganisms, known as biomass, to treat the wastewater. By managing the conditions of the biological process, the biomass can treat the wastewater to meet effluent requirements and then be settled out to produce a final effluent.

Wastewater treatment systems must have sufficient flexibility to operate at the initial flows from the first units served up to full design capacity and to manage flows that vary throughout the year, particularly in seasonal communities all the while providing the treatment necessary to meet discharge requirements. Treatment systems are required to be designed to serve a design wastewater peak flow of 300 gallons per day (gpd) per dwelling unit in accordance with DNREC requirements.

Q. ARE THERE DIFFERENT TYPES OF BIOLOGICAL TREATMENT SYSTEMS?

A. There are many types of biological treatment systems. AWMI currently operates three (3) types of wastewater treatment systems: the Sequential Batch Reactor (SBR), the ISAM™ Integrated Surge Anoxic Mix batch reactor, and the Bio-Wheel™ wastewater treatment plant. Each is described in some detail including advantages and disadvantages in Exhibit I.

Q. WHAT ARE THE CONSIDERATIONS RELATING TO WASTEWATER DISPOSAL SYSTEMS?

A. Although regulations allow for both surface and groundwater discharge systems, DNREC policy effectively requires all wastewater systems to utilize some form of groundwater discharge. The groundwater discharge system is also preferred by AWMI as a discharge that recycles water back into aquifers that are the water supply in the areas we serve. Groundwater discharge systems include subsurface systems, rapid infiltration basins (RIBs), and spray irrigation. Subsurface and RIB systems typically utilize treatment plants that provide higher levels of treatment prior to disposal. These systems require less land and operate year-round since they are not dependent on weather or other conditions for effluent disposal. Spray irrigation systems require more land and typically provide less treatment prior to disposal depending on the plants and soil in the irrigation area for further treatment and nutrient reduction. Spray irrigation systems are susceptible to weather conditions such as freezing and precipitation. As such, these facilities must provide significant effluent storage capabilities.

Q. CAN YOU DESCRIBE THE DNREC PERMITTING PROCESS FOR UTILITY WASTEWATER SYSTEMS?

A. All wastewater systems must receive a permit from DNREC prior to construction and operation. Groundwater discharge systems other than spray irrigation are permitted in accordance with DNREC's On-Site Regulations. Our systems must be permitted in accordance with the requirements for large systems which require an extensive series of investigations prior to preparation of a system design and permit application.

The permitting process begins with the letter of intent which provides DNREC with notice that investigations are being initiated for a large wastewater system. Most projects will then prepare a feasibility investigation where initial investigation information is prepared and submitted to DNREC. If DNREC agrees, they will issue a Non-Binding Statement of Feasibility for a proposed wastewater system. The Non-Binding Statement of Feasibility is used to satisfy certain preliminary requirements for local government approvals.

The next investigation is the Soil Investigation Report (SIR). The SIR is a thorough investigation in accordance with the On-Site Regulations of the soils at the proposed disposal site conducted by a professional Soil Scientist, licensed by DNREC. The SIR results in a mapping of the suitable soils and determination of certain system design criteria for each soil type identified such as infiltration rate, depth to seasonal high water table (SHWT), and identification of any limitation that could affect system performance.

The Regulations also require the preparation of a Preliminary Groundwater Impact Assessment (PGIA), which is an evaluation of the impact of the proposed system on groundwater. The requirements for the PGIA have changed as more large groundwater discharge systems have been permitted. Initial PGIAs focused on the distribution of nitrogen and the extent that nitrogen concentrations might exceed drinking water standards. Later, as most systems began providing treatment to reduce nitrogen to less than drinking water standards, the PGIA began to focus on the effect of the discharge on the groundwater level directly under the disposal system, known as groundwater mounding. The analysis of mounding provides verification that a suitable unsaturated soil treatment zone is maintained beneath the disposal system for effluent polishing. The PGIA includes site-specific testing necessary to determine aquifer properties and computer models that determine groundwater mounding from the proposed disposal system. The PGIA also includes a summary of local hydrogeology, background water quality, local land use, and a survey of all local water wells so potential impacts can be evaluated.

Once the SIR and PGIA are approved by DNREC, the design engineer will prepare the design for the proposed wastewater system. The design must take into account the findings of the investigations to provide a system with suitable capacity to serve the proposed project. Systems must be designed and permitted to handle a design flow of 300 gpd/unit for any units that are to be connected to the system in accordance with DNREC's requirements. Once the design documents and engineering reports are prepared for the proposed system, they are included with a construction permit application and submitted to DNREC. The construction permit authorizes construction only and the system may not be placed into operation until an operating permit is issued.

Once the construction permit is issued, the construction of the system may begin. The construction must be completed by a contractor licensed by DNREC in accordance with the On-Site Regulations. During construction, the work is reviewed by DNREC and the design engineer and the disposal system is also reviewed by the licensed soil scientist. Once the construction is complete, the design engineer must review and certify that the work has been completed in accordance with the design and permit. DNREC also conducts their inspection of the system and, once satisfied that the work has been completed in compliance with the construction permit, will issue an operating permit allowing the system to be placed into operation.

Q. CAN YOU EXPLAIN THE COUNTY APPROVALS REQUIRED FOR A UTILITY WASTEWATER SYSTEM?

A. In addition to any DNREC approvals, utility wastewater systems are subject to approval by individual County Engineering Departments. The County's engineering review typically requires conformance with local and national engineering standards and is completed in coordination with the DNREC review. DNREC will not issue their construction permit until County governments have had an opportunity to review and provide comments on the proposed system.

In Kent County, all utility wastewater systems located in residential areas must receive zoning approval as a conditional land use. When the wastewater system is located within a proposed community, the necessary conditional use approval is usually completed concurrent with the subdivision approval process.

A conditional use approval is necessary where a particular land use, such as a utility wastewater system, is not a permitted use in a particular zoning district, but is listed as a conditional use. The conditional use allows the local government to place conditions on the project as part of the approval process.

In Sussex County, utility wastewater systems that serve only the community that they are located within do not need any specific zoning approval. Sussex County does require a wastewater system to obtain a conditional use approval if the wastewater system will serve anywhere other than the initial subdivision site.

Q. WHAT PRINCIPLES DOES AWMI UTILIZE TO DEVELOPMENT OF COST-EFFECTIVE UTILITY WASTEWATER MANAGEMENT SYSTEMS?

A. AWMI uses a regional system approach with phased facility construction to develop wastewater management facilities that are cost-effective to construct and operate. We also work closely with regulators, particularly DNREC and local government officials, to ensure that regulatory programs meet State and local goals while still allowing the flexibility to implement and operate cost-effective wastewater management systems.

Q. WHAT ARE REGIONAL WASTEWATER SYSTEMS AND HOW DO THEY HELP MAKE THE FACILITIES MORE COST EFFECTIVE?

A. Most communities not served by existing municipal sewer systems but requiring central sewer historically proposed community systems to serve only the individual community being developed. AWMI has taken a few of these systems with the most disposal capacity and made them regional systems serving multiple communities while avoiding building those other individual community systems. AWMI has developed regional wastewater management plans that are reviewed annually with DNREC and local government officials to document our regional wastewater planning concepts and the coordination of the permitted capacity of our regional systems. AWMI has also used an interim regional approach to bring wastewater from the early phases of developing communities to a nearby regional facility, thereby utilizing existing capacity and delaying the need to construct future transmission and/or treatment and disposal systems.

Q. WHAT IS THE PERMITTED CAPACITY REQUIRED FOR REGIONAL SYSTEMS?

A. Regional systems must be designed and permitted by DNREC to handle the wastewater generated by all of the units in any subdivision connected to our regional systems even if the build out of those projects could be years. In other words, there must be designed and permitted wastewater capacity at 300 gpd/unit for every unit in every subdivision that a utility serves, although the actual constructed capacity only needs to be that which is needed to serve the number of units that are actually connected to the facility.

Q. HOW DOES AWMI USE PHASING TO CREATE COST EFFECTIVE WASTEWATER MANAGEMENT SYSTEMS?

A. As previously noted, regional systems must be designed and permitted to serve all units in all subdivisions that are connected to the regional system, even if the build out of those projects could be years away. This creates the need to have system designs that are much larger than initially needed. To address the difference between the need for large treatment and disposal system design capacities and much smaller initial demands, many AWMI treatment facilities have been planned and designed to be constructed in phases. The phased approach avoids over construction of treatment facilities that may not be utilized by proposed units for extended periods of time.

There are practical limits to the size of individual phases in wastewater treatment systems, but phasing allows the wastewater systems to grow as their service areas grow. AWMI finds that wastewater systems should not be divided into more than four (4) phases, nor have phases that are less than 50,000 gpd (167 units of service). Although treatment systems, which are the majority of the system cost, are usually phased, disposal systems, particularly RIBs are not. Since the phasing of the RIB system would create more individual RIBs in the disposal area, valuable capacity would be lost to the construction of additional berms at relatively little cost savings as compared to treatment system phasing.

IV. WASTEWATER MANAGEMENT SYSTEM DESCRIPTIONS

Q. PLEASE DESCRIBE THE VARIOUS WASTEWATER SYSTEMS THAT AWMI CURRENTLY OPERATES?

A. AWMI operates five (5) wastewater systems: Stonewater Creek, Heron Bay, Beaver Creek, Reserves at Lewes Landing, and Southfield. There are also two (2) facilities that are currently served by temporary facilities: Shoreview Woods, which is served by a developer-funded temporary holding tank; and Windstone, which is served by a temporary interconnection with Sussex County. The facilities are currently under construction which will connect both of these projects to the Beaver Creek system.

Q. IS THERE A DOCUMENT THAT DESCRIBES EACH OF THESE SYSTEMS?

A. Exhibit 2 has been prepared which provides a description of the history, planning, and physical facilities for each of the five (5) permanent systems. In addition, there are planning maps provided as Attachment(s) 2-1 – 2-3 for each of the systems that provides regional wastewater management.

Q. CAN YOU PLEASE PROVIDE AN OVERVIEW OF THE HISTORY, PLANNING, FACILITIES AND UTILIZATION OF THE STONEWATER CREEK WASTEWATER SYSTEM?

A. Stonewater is one of AWMI's regional wastewater management facilities. The developers of the Stonewater Creek community initially set aside land within the community and had an original design and permit issued for a community wastewater system to serve their project. Their wastewater treatment and disposal system was developed without phasing to manage the wastewater from 750 dwelling units to serve the Stonewater Creek project (545 units) and possible expansions of the community on lands to the west of the project now known as Pelican Pointe.

AWMI took over the Stonewater wastewater system from the developer as the initial phases of the development were under construction. At that point the developer had already installed the collection, pumping and transmission systems for the project which were permitted in accordance State and local requirements, but installation had not yet started on the treatment and disposal facilities.

AWMI was able to take the resources of the Stonewater community wastewater system and develop a regional system to serve up to 1,350 units with a treatment system to be constructed in three (3) phases.

The wastewater management system consists of gravity sewers and a sewage pumping station and a dual basin sequential batch reactor (SBR) wastewater treatment plant. The SBR system was chosen at Stonewater Creek because of its compatibility with larger capacity phases and its high degree of operational flexibility. The current wastewater treatment phase can serve 750 dwelling units.

Wastewater disposal consists of six (6) rapid infiltration basins (RIBs). The RIB disposal system was conservatively designed to serve the proposed wastewater discharge utilizing the areas of soils at the site that were deemed to be best suited for wastewater disposal.

AWMI has a number of wastewater CPCNs in the vicinity of Stonewater. When AWMI took over Stonewater, they undertook hydrogeological evaluations of the maximum hydraulic capacity of the RIB disposal system to determine if the wastewater management needs of these additional communities could be served at Stonewater. These evaluations determined that the RIB disposal system conservatively designed to serve 750 units would actually serve 1,350 dwelling units. AWMI has designed and permitted additional phases for the Stonewater treatment system that will match the disposal capacity in a total of three (3) treatment phases.

AWMI has obtained conditional use approval from Sussex County to allow the Stonewater Creek wastewater management facility to serve other projects in this vicinity as a regional wastewater system. AWMI's planning has allowed regional service to be extended to the first of these projects from Stonewater Creek to the Independence community with a planned development of 450 units. The wastewater collection/transmission system at Independence consists of gravity sewers, a pumping station, and a force main to Stonewater. By serving Independence at Stonewater, AWMI was able to avoid construction of a separate wastewater treatment and disposal system that had been planned and permitted at Independence at considerable savings to all customers.

AWMI has a number of CPCNs and proposed developments in the vicinity of the Stonewater facility and has investigated and planned for expansion of Stonewater Creek utilizing adjacent lands to further utilize the economies of scale to provide cost-effective service.

As of September 30, 2012, the Stonewater facility has an operating capacity of 750 units and is serving 402 units, or a utilization of 53.6%

Q. CAN YOU PLEASE PROVIDE AN OVERVIEW OF THE HISTORY, PLANNING, FACILITIES AND UTILIZATION OF THE HERON BAY WASTEWATER SYSTEM?

A. The Heron Bay wastewater system serves as a regional facility on an interim basis. The developers of the Heron Bay community initially set aside land within the community and had an original design and permit issued for a community wastewater system to serve their project. Their wastewater treatment and disposal system was developed without phasing to manage the wastewater from 325 dwelling units in the Heron Bay project.

AWMI was able to take the resources of the Heron Bay community wastewater system and develop an interim regional system that could be constructed in two (2) phases and provide service to nearby AWMI wastewater projects on an interim basis while the Heron Bay project was developing and delay the need for regional transmission system components to the Stonewater Creek facility until more users had been developed in the area.

The wastewater system consists of gravity sewers and a sewage pumping station.

The wastewater treatment system consists of a two (2) phase ISAM treatment plant. The first phase was designed to serve 166 units. The ISAM treatment system was chosen for the Heron Bay project because of its compatibility with the proposed phasing of approximately 50,000 gpd (167 units) per phase. In 2011 when the initial phase was reaching capacity, the second unit was installed bringing the total capacity to 325 units.

Wastewater disposal at the Heron Bay facility consists of six (6) RIBs. The RIBs are capable of serving 325 units.

AWMI has obtained conditional use approval for Heron Bay to serve as a regional wastewater system. Since that approval, AWMI has extended service on an interim basis to serve the Oakwood Village project with a planned development of 118 units. Oakwood Village is in the Stonewater Creek regional wastewater system planning area, but interim service at Heron Bay delays construction of wastewater transmission from Oakwood to Stonewater. The wastewater system at Oakwood Village consists of gravity sewers, a pumping station and a force main to Heron Bay. Serving Oakwood at Heron Bay avoided constructing a separate wastewater system at Oakwood Village.

Regional planning for Heron Bay identified three (3) additional AWMI wastewater service communities with a combined 446 dwelling units, as potential candidates for interim wastewater management at Heron Bay to serve the initial phases of their development until they are later connected to the Stonewater facility.

As of September 30, 2012, the Heron Bay facility has an operating capacity of 325 units and is serving 222 units, or a utilization of 68.3%.

Q. CAN YOU PLEASE PROVIDE AN OVERVIEW OF THE HISTORY, PLANNING, FACILITIES AND UTILIZATION OF THE BEAVER CREEK WASTEWATER SYSTEM?

A. Beaver Creek is one of AWMI’s regional wastewater management systems and includes additional interim connections. The developers of the Beaver Creek community initially set aside land within the community and had an original design and permit issued for a community wastewater system to serve their project. Their wastewater treatment and disposal system was developed without phasing to manage the wastewater from 500 dwelling units to serve the Beaver Creek project (322 units) and possible expansions of the community on lands to the south of the project near the Town of Harbeson.

AWMI was able to take the resources of the Beaver Creek community wastewater system and develop a regional system with an initial capacity of 500 units and future expansion potential for 1,000 or more units including a treatment system to serve the initial capacity to be constructed in three (3) phases.

The Beaver Creek wastewater system consists of gravity sewers and two (2) sewage pumping stations. One pump station serves the portion of the project known as the Trails of Beaver Creek. A temporary pump station was constructed to serve the first 42 units of the portion of the project known as the Meadows of Beaver Creek. Construction is currently underway for the permanent pump station to serve the Meadows.

The wastewater treatment system was originally designed as a three (3) phase treatment plant. The first phase, with a capacity of 167 units, was initially installed in 2011. As the first phase neared capacity, AWMI engineering and operations evaluated the continued development of the plant with the two (2) remaining phases versus a conversion of the facility to a dual basin (initially 250 units capacity each phase) SBR treatment plant. AWMI had a unique opportunity with the dual basin SBR as it had acquired the tankage and equipment of the Bethany Bay wastewater treatment system when that facility was decommissioned. The evaluation found that utilizing the acquired equipment allowed the construction of a wastewater system with a lower overall cost and a much more flexible and operator friendly treatment system. The first phase of the dual SBR system was completed in the fall of 2012 can serve 250 dwelling units.

Wastewater disposal at the Beaver Creek facility consists of six (6) RIBs. The RIB disposal system was conservatively designed to serve Beaver Creek. When AWMI took over Beaver Creek, they evaluated the RIB disposal system and determined it would actually serve 1,000 dwelling units and remaining suitable soils at the site could potentially serve up to 2,000 units.

AWMI has obtained conditional use approval for Beaver Creek to serve as a regional system. AWMI is currently in the process of extending service on an interim basis from Beaver Creek to the Shoreview Woods and Windstone projects with a combined development of 465 units. The wastewater system at Windstone consists of gravity sewers, a pumping station, and a force main that initially discharged wastewater on a temporary basis to the Sussex County sewer system. AWMI is currently in the process of installing a force main to transmit wastewater from Windstone to Shoreview Woods. The wastewater system at Shoreview Woods consists of gravity sewers, a pumping station, and a force main to Beaver Creek. Shoreview Woods is currently served by a temporary holding tank. By serving Shoreview and Windstone on an interim basis at Beaver Creek, AWMI was able to avoid constructing a separate wastewater system at Windstone and delay the construction of a future regional wastewater management facility.

Regional wastewater planning for the Beaver Creek facility has identified an additional community with 214 dwelling units for interim wastewater management.

As of September 30, 2012, the Beaver Creek facility has an operating capacity of 167 units and is serving 182 units (Actual operating flows were not exceeding permitted flow limits, and expansion to 250-unit capacity was 95% complete), or a utilization of 110.8% (74.0% at expanded capacity).

Q. CAN YOU PLEASE PROVIDE AN OVERVIEW OF THE HISTORY, PLANNING, FACILITIES AND UTILIZATION OF THE RESERVES AT LEWES LANDING WASTEWATER SYSTEM?

A. Reserves at Lewes Landing is a stand-alone community wastewater management facility planned and permitted by the developers with extensive input from AWMI to serve the project's 97 units. The Reserves at Lewes Landing wastewater management system consists of gravity sewers and a sewage pumping station. The wastewater treatment system, a Bio-Wheel™ as described in Exhibit 1, is designed to serve 97 dwelling units. Wastewater disposal at Reserves consists of six (6) subsurface drip irrigation zones.

There is no planned expansion or regionalization of the Reserves and Lewes Landing wastewater management system due to the limited disposal capabilities at this site. Further, since the wastewater treatment and disposal system has already been developed and the project is not in the immediate vicinity of any existing regional wastewater system, there are no current plans to connect this facility to a regional system.

As of September 30, 2012, the Reserves facility has an operating capacity of 97 units and is serving 75 units, or a utilization of 77.3%.

Q. CAN YOU PLEASE PROVIDE AN OVERVIEW OF THE HISTORY, PLANNING, FACILITIES AND UTILIZATION OF THE SOUTHFIELD WASTEWATER SYSTEM?

A. Southfield is currently a temporary community wastewater management facility.

The Southfield wastewater system, planned and permitted by the developers with extensive input from AWMI, will serve the project's 100 units. The Southfield wastewater management system consists of gravity sewers to serve the community and a sewage pumping station that would transmit wastewater to a proposed wastewater treatment and disposal system that is located near the center of the project. Currently, the earliest phases of the project are served by a temporary holding tank, which has a permitted capacity of 55 units. The temporary holding tank capacity is based on the storage capacity of the installed components of the existing sewer collection system and manholes.

There were no plans for expansion or AWMI regionalization of the Southfield wastewater management system due to the limited disposal capabilities at this site.

Currently, AWMI is investigating an interconnection with the Kent County wastewater system for wastewater treatment and disposal. Kent County now has a force main running immediately adjacent to the Southfield project which was not planned during the initial design of this project. If Southfield is connected to the Kent County system, the proposed treatment and disposal system would not be constructed.

V. PROPOSED ADDITIONAL PROJECTS

Q. SCHEDULE 2A INCLUDES A NUMBER OF PROPOSED ADDITIONS TO THE TEST YEAR PLANT. CAN YOU REVIEW EACH OF THE PROJECTS THAT ARE INCORPORATED INTO THE PROPOSED ADDITIONS?

A. Yes, they are as follows:

<u>354.004 - Treatment & Disposal Structures & Improvements - $1,563,754</u>

$50,000 Wastewater Station Improvements – Funds for wastewater station improvements that need to be completed during the calendar year but were not otherwise budgeted

$1,513,754 Beaver Creek WWTF Phase II – As previously discussed, the second phase of the Beaver Creek wastewater treatment facility is being completed to increase the capacity of the regional system. This project was placed into service in December of 2012.

<u>360.002 - Collection Sewers - Force - $460,000</u>

$460,000 Windstone Force Main – As previously discussed, a force main is being installed to interconnect the Windstone project to the Beaver Creek regional wastewater treatment facility on an interim basis. This force main extends from the point of the Windstone temporary interconnection to the Sussex County wastewater system to the Shoreview Woods facility. This same force main will serve to connect Windstone to a future wastewater facility on a permanent basis. This project is expected to be complete in February of 2013.

<u>361.002 - Collection Sewers - Gravity - $60,580</u>

$60,580 Windstone Phase 1-B.2 Collection System – Construction of the wastewater collection system mains (gravity sewer mains and manholes) for Phase 1-B.2 of the Windstone community. This is a developer funded asset which is offset by a contribution in aid of construction (CIAC) for this asset.

<u>363.002 - Services - $26,543</u>

$26,543 Windstone Phase 1-B.2 Collection System – Construction of the wastewater collection system services (utility service laterals and clean-outs) for Phase 1-B.2 of the Windstone community. This is a developer funded asset which is offset by a CIAC for this asset.

<u>371.003 - System Pump Plant Pump Equip - $590,000</u>

$250,000 Beaver Creek Trails Pump Station – Upgrades to the pump station serving the southern portion of the Beaver Creek project known as the Trails at Beaver Creek. These upgrades will increase the flow and discharge pressure capabilities of the pump station, install piping modifications to improve maintenance capabilities, and install an engine-driven emergency by-pass pump as a back-up in the event of a failure in the primary pumping system. The increased flow capacity in this upgrade will allow this pump station to manage flows associated with the connection of the Shoreview Woods and Windstone communities to the Beaver Creek regional system and will serve other permanent regional connections in the future.

$300,000 Beaver Creek Meadows Pump Station – AWMI contributions, in accordance with the project's wastewater services agreement, to the construction of the pump station serving the Meadows at Beaver Creek that is being constructed by the project developer. The Meadows is currently being served by a temporary pump station with limited capacity. This pump station will serve the entire Meadows community.

$40,000 Windstone Pump Station Upgrades – Upgrade of the pumps at the existing Windstone pump station that will increase the discharge head capabilities as necessary to connect to the new, and longer, wastewater force main to the Shoreview Woods community.

<u>380.004 - Treatment & Disposal Plant Equip - $39,499</u>

$39,499 Stonewater Creek Lime Feed System – Installation of a new lime feed system for pH control at the Stonewater Creek regional wastewater treatment facility. The new lime feed system will utilize a batch liquid lime slurry system with sufficient capacity to operate unattended over weekend and holiday periods. The new system will replace the existing system which utilizes a continuous lime slurry makeup with limited unattended operating capacity that was installed by operators utilizing used equipment that was retired from Artesian Water Company. The existing system no longer has sufficient capacity for periods of unattended operation requiring additional operator attention during weekends and holidays.

<u>390.003 - Office Equip - Computer Hardware - $15,000</u>

$10,000 AWMI Information Systems – New micro computer equipment and software for AWMI operations.

$5,000 Replacement Equipment for Retired Operations – Replacement of micro computer equipment and software for AWMI operations.

<u>393.007 - Tools, Shop & Garage Equip - $25,000</u>

$25,000 Tools, Shop & Garage Equipment – Tools, shop and garage equipment for AWMI maintenance and operations vehicles and maintenance shop.

<u>394.007 - Lab Equipment - $10,000</u>

AWMI wastewater treatment facilities and mobile operator laboratory equipment.

<u>397.007 - Misc Equip - $39,000</u>

$15,000 Stonewater and Heron Bay Actuator Replacements – Scheduled replacement (2 per year) of motor-operated valve actuators at the Heron Bay and Stonewater Creek wastewater treatment facilities utilizing equipment demonstrated to be more reliable and lower maintenance than existing units.

$14,000 Composite Sampler Replacement - Scheduled replacement (2 per year) of existing refrigerated composite samplers. Collection of composite samples of influent and effluent are required by DNREC and for proper operation of the wastewater treatment facilities. Reliable operation of the composite samplers is needed for accurate analytical results. Regular replacement ensures reliable operation.

$10,000 Tools – Miscellaneous tools for wastewater facilities operation and maintenance.

VI. OPERATING EXPENSES – FIXED VERSUS VARIABLE

Q. CAN YOU EXPLAIN THE DIFFERENCE BETWEEN FIXED AND VARIABLE OPERATING EXPENSES?

A. Fixed operating expenses are those expenses that occur independently of the amount of wastewater processed. Many of the operating requirements for a wastewater facility are fixed simply by the fact that there is an operating wastewater treatment facility, regardless of the amount of wastewater that the facility is processing. The facility has to be staffed and maintained, the heat and lights have to be on, a minimum amount of aeration must be provided to the wastewater plant to maintain the biological population, accounts have to be processed, laboratory tests have to be run, reporting must be made to regulatory agencies and that type of thing. On the other hand, variable operating expenses are directly related to the processing of the wastewater. For each gallon of wastewater processed, electricity must be provided to operate pumps and to provide additional aeration at the treatment facility to assist in the treatment of the waste above and beyond the minimum aeration requirements to maintain the biological population, additional lime must be added to maintain pH, and more sludge will be generated based on the amount of wastewater treated.

Q. USING THE OPERATING EXPENSES LISTED IN SCHEDULE 3B CAN YOU PROVIDE AN ESTIMATE OF THE BREAKDOWN OF AWMI EXPENSES AS VARIABLE VERSUS FIXED?

A. Based on a conservative assumption that all power costs are variable, which they are not as previously explained, approximately 10% of the listed AWMI expenses (Sludge, Power, Chemicals) are variable and the remaining 90% are fixed.

Q. DO YOU HAVE ANY FURTHER TESTIMONY?

A.